Examining Marine Safety Operations

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Millions of crew transfers must be carried out around the world each year to keep the offshore industry going. Crew supply is one of the highest-risk activities in offshore operations, whether passengers are moved by helicopter or boat. Historically, risk management for marine-based crew supply has received little priority, and a lack of reliable information has generated misconceptions about the true risks and has masked breakthroughs. However, many operators are now attaching a high level of importance to all crew-supply activities. Exceptional progress has been made in the development of safer, more efficient alternatives, with operators, vessel owners, and transfer specialists all making important contributions.

Many operators are now looking more closely at their crew-supply options and are re-evaluating established methods. Choices are being influenced by a number of factors, such as cost, downtime risk, passenger comfort, journey times, and safety. A new generation of high-speed crew-supply vessels brings the prospect of fast, efficient, and safe vessel-based crew supply to the industry, which may place even greater focus on the evaluation of these operations.

For industry professionals to make appropriate choices and to drive safety improvements, they need a good appreciation of the risks. In vessel-based crew supply, the crane-transfer operation is widely accepted as the key safety concern. A scarcity of data both on activity levels and on incidents has made it difficult to develop a clear picture of safety performance. However, in the past few years, progress has been made. A major US operator and a major international vessel company have shared their personnel-transfer-incident data with Reflex Marine, and these incidents were added to an existing database gathered from public sites, including the US Minerals Management Service, the Petroleum Safety Authority in Norway, and the UK Health and Safety Executive, as well as from private reports.

It is estimated that more than 5 million crane transfers take place each year, a large-scale activity of an order comparable to the numbers moved by helicopter. The collated sample data include more than 60 crane-transfer incidents, resulting in 48 injuries and seven fatalities. Of those incidents, most of which occurred within the past 10 years, 32% involved lateral impact, 40% falling, 23% heavy landing, and 5% immersion. Although crane transfers are rightly regarded as a high-risk operation, it is important to view this in the wider context. The data indicate that the level of fatalities (per crew transfer) is lower than for helicopters, although injury rates are considerably higher.

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Understanding the Risks

Analysis of the collated data indicates that the vast majority of crane-transfer incidents happen on the deck of the vessel. Perhaps less predictable are the high levels of incidents that occur during pickup off the deck of the vessel, which exceeded those caused by heavy landing. The analysis indicates that incidents during pickup are usually caused by a "pendulum swing effect" resulting from misalignment between the crane line and the transfer device. The dynamic motion of a vessel makes it difficult to ensure that a crane is centered directly over a load before making a lift. Off-centered lifts result in a pendulum motion, which can lead to collisions. Such collisions are part of the everyday concerns of offshore crane operators and deck crews, who are trained to anticipate, to manage, and, often, to control such motions. However, given the number of variables involved (e.g., vessel motion, crane motion, and timing of lifts), it is an unrealistic expectation to completely avoid such collisions.

Incidents caused by heavy landings tended to result in injuries such as fractures and back injuries. On the other hand, collisions during pickup can result in falls from height, which are much more likely to result in serious injuries or fatalities. Immersion incidents were found to be relatively rare, although it should be acknowledged that when they do occur, the potential for a fatality is high, particularly in harsh environments.

In general terms, the analysis of past incidents established that traditional transfer equipment offers inadequate protection in situations where things do go wrong. The provision of more robust and protective carriers was therefore viewed as a priority. It was concluded that 80% of all incidents could be avoided with better equipment and operational controls.

Engineered Protection

Engineered protection in a modern car provides a secure environment that can protect passengers from impacts. A well-designed transfer device should do the same and guard against the inevitable human factors contributing to the majority of incidents. Improved operational controls, communications, and training also play a significant role in reducing risk.

Traditional transfer methods rely too heavily on human judgment and responses that, if not undertaken with proper training and procedures, can play a major role in causing serious accidents. The situation can be brought under control in three ways:

• **Equipment design**—Transfer devices can be designed to make allowances for human error. They can protect passengers from incidents caused by lack of awareness, lapses of concentration, or mistimed responses.

• **Procedural control**—A clearer understanding of the risks can lead to the development of better procedures and operational controls.

• **Awareness and training**—Improved risk awareness and understanding of best practices can help to eliminate incidents.

After analysing the available data and studying the risks involved in moving people by crane, Reflex Marine developed the transfer capsule called the Frog, designed to address the four main risks associated with crane transfer:

• A robust external frame and seat restraints protect against lateral impacts. Collisions caused by the swing factor are common following pickup from the vessel.

• Vertical-impact protection for heavy landings is provided by a spring-mounted seat base combined with shock-absorbing feet.

• Seatbelts ensure that falls from height during transfer are very unlikely.

• In the event of immersion, the capsule's buoyancy ensures it will right itself and float.

The rope-basket method of transportation in the industry is often seen as a rite of passage, and such a mindset is often difficult to change. The belief in relative benefits of being strapped into a device or free-standing on a basket-type device is one such misconception. A common argument for the basket is that you can jump off if required or fend off objects. The confusion arises with the assumption that an element of personal control makes one safer. Standing on the outside of a swinging transfer device relying solely on your grip while possibly sacrificing one point of stability by "fending off" with a foot or hand is a vulnerable position. Similarly, when you land, relying on your timing, flexing your knees, and stepping off backward at the moment of landing put a lot of dependence on human responses. Usually it works, but not always. Another misconception is that it is dangerous to travel seated or strapped in.

New High-Speed Crew Vessels

The emergence of new equipment and operational philosophies is leading many industry professionals to take a fresh look at their crew-supply options and associated risks, efficiencies, and costs. Transit speed and passenger comfort are now being addressed by some vessel operators. Seacor Marine has commissioned a new 165-ft, high-speed aluminum catamaran, which will be the fastest vessel in the US Gulf of Mexico, capable of top speeds ranging from 36 to 42 knots. This state-of-the-art vessel will carry up to 150 passengers, and journey times are expected to narrow the gap between boat and helicopter transport.

Compared to a 12-passenger helicopter, which could take approximately 2 days with multiple trips (or multiple aircraft on the same day) to transport 150 people more than 100 miles, this vessel is able to deliver the same number of personnel in one trip, taking less than a day. The catamaran hull provides stability and minimizes vessel roll, and a wide deck reduces collision hazards. It was designed by one of the world's foremost catamaran designers, Incat Crowther of New South Wales, Australia, and is scheduled to begin work in the US Gulf of Mexico in early 2008.

Looking Forward

Few would dispute that the provision of safe and cost-effective crew supply is not merely a nice-to-have, but a prerequisite for the offshore industry. Recent developments in the marine sector are set to have important implications for operators. Analysis performed on incident data suggests that with proper protection and controls in place, operators could realistically expect injury levels to decline.

Improvements in transfer safety, combined with the introduction of a new generation of vessels, could change the face of offshore crew supply, with cost savings for operators. As this sector grows in stature, it is important that it take on a more professional aspect. The availability of basic data is essential to risk-based decision making, focused allocation of resources, and effective tracking of performance. If the industry can move in this direction, choices will be determined less by myth and hunches and more by rational evaluation. The result will be safer crew-supply operations and value-driven decision making to this important industry activity. **JPT**